Reconstructing *Scaphognathus crassirostris*

MATERIALS:

- scissors
- ruler
- transparent tape
- photocopy of exact-size fossil bones

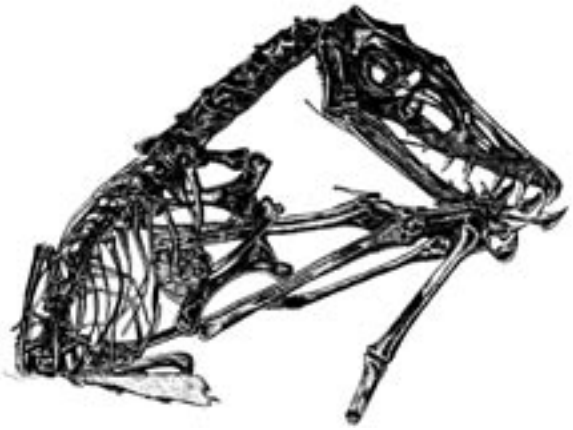
The fossilized remains of the animal illustrated in Figure 2.3 were found in a limestone quarry in Germany in 1826. About one hundred and fifty million years ago, the quarry was a deep ocean lagoon (Figure 2.4). Organisms that died and sank to the bottom of the lagoon were buried by fine particles of lime mud. Fine details of organisms were preserved in the limestone. Water currents did not redistribute skeletons.

Georg August Goldfuss was the scientist who found the specimen. He cut out a slab of limestone with the fossil and took it to his laboratory for study. Goldfuss reconstructed the bones of the fossil animal, and then put the bones together to form a complete skeleton in a lifelike posture.

The purpose of this activity is for you to try to solve the very same mystery Goldfuss confronted. What did the assembled skeleton of this fossil animal look like? And then: What kind of life did this animal live in Germany about 150 million years ago?

FIGURE 2.3

Original specimen of *Scaphognathus crassirostris* found by Goldfuss.



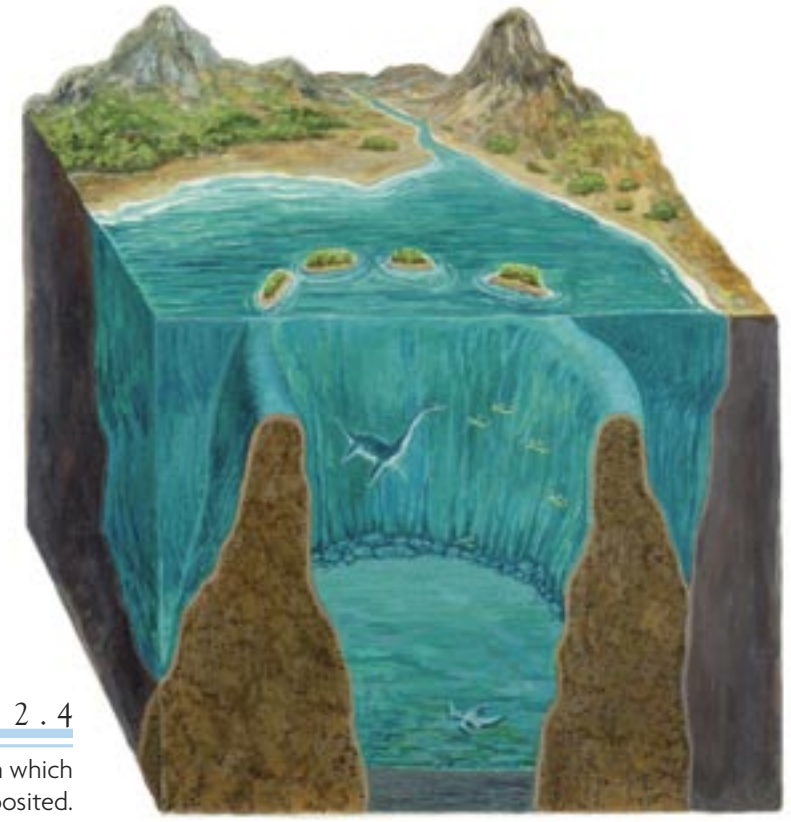


FIGURE 2.4

Reconstruction of lagoon environment in which *Scaphognathus crassirostris* was deposited.

Objectives:

1. Reconstruct the skeleton of a mystery fossil from the Jurassic Period.
2. Make inferences about what the fossil animal looked like when alive, what food it ate, and its mode of transportation.

Procedure:

1. Cut out the life-size pictures of the mystery fossil's bones as originally drawn by Goldfuss (Figure 2.5).
2. Use your knowledge about vertebrate skeletons and if available, the pictures of skeletons of such familiar animals as mammals, birds, and lizards. Begin your assembly at the head with the skull and jaw. Lay out the bones of the neck, chest, hip, and tail. Add the smaller leg bones to the hip. The thigh bone fits into the hip bone. A single leg bone connects with the thigh (you have two leg bones in each of your own legs). The small 4-toe feet connect with the leg bones. The larger upper arm bones connect with the shoulder blades. The lower arm bones are composed of two fused bones, to which the hand connects at the wrist. The fifth finger of each hand of the fossil is almost as large as its entire body.

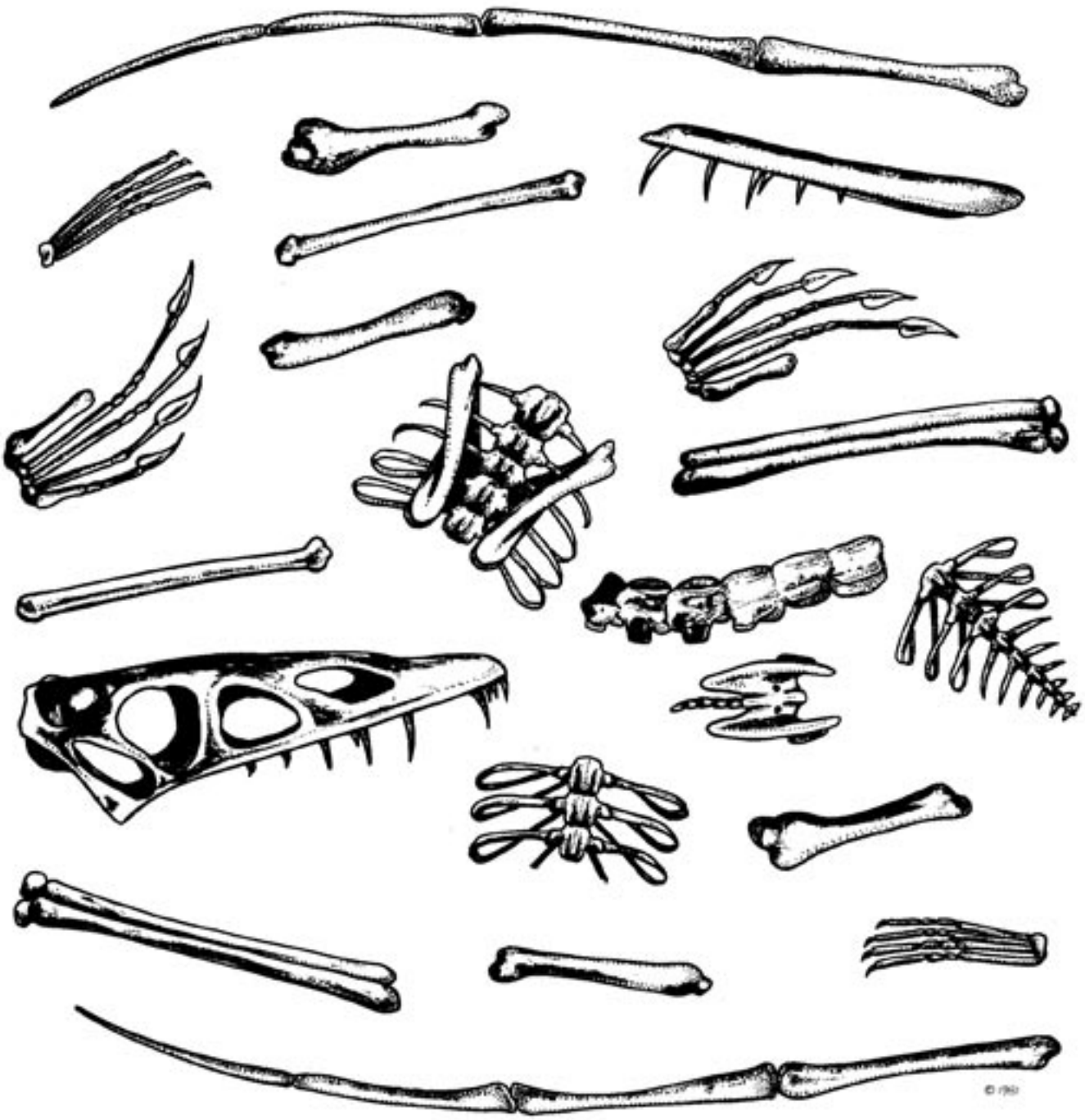
When your skeleton is assembled to your satisfaction, fix it in position by taping the bones together. You may wish to mount the model skeleton on a piece of poster paper.

Analysis:

1. How tall was the animal? _____ How wide was the animal when spread out? _____ Most animals barely float in water. Knowing the approximate volume of the animal and the density of water, what do you estimate the weight of the animal to be? _____
2. What do you think was the function of the huge finger on each hand?
3. What modern animals do you think this fossil was most like? In what ways does it appear to have differed from modern animals that may live like it did?
4. What do the teeth in the skull and jaw tell you about feeding habits? How do you explain the large open spaces in the skull, the hollow long bones? The small feet with tiny claws and the large hands with large claws?

FIGURE 2.5

Life-size picture of the fossil as originally drawn by Goldfuss.



Restoring *Scaphognathus crassirostris*

MATERIALS:

- crayons
- water paints
- poster paper
- clay

Once paleontologists have reconstructed the skeleton of a fossil vertebrate (Figure 2.6), they begin thinking about the appearance of the living animal, its habitat, how it lived with other organisms, and how it was adapted to its physical environment. In this part of the activity you have the opportunity to restore the fossil and put it into the environment to which it was adapted. For an example of the product of this approach see Figure 2.7.

Procedure:

1. Look at the fossil skeleton for several minutes. Think about who this animal was, living around 150 million years ago in a tropical land by the sea now known as Germany. Measure the length of the head and the length of the body. Imagine how it might have moved about: For what purposes did it use the claws on its fingers? Was its skin bare, or was there a protective and/or insulating covering?
2. Now in the imaginative part of your mind pretend you and this beautiful beast are buddies. Spend a Jurassic day together: Travel together, eat together, double date. Become part of its life. Call it by its scientific name, *Scaphognathus crassirostris*.
3. Draw and color a scientifically accurate portrait of *Scaphognathus crassirostris* in a typical pose. Include in the background of the portrait evidence of its modes of locomotion, feeding behavior, and its habitat. You may wish to create a sculpture of the animal and include elements of its environment. See Figure 2.6 for an example of a reconstruction.
4. On the reverse of the picture, or on separate paper, make a list of questions about *Scaphognathus crassirostris*—questions you truly wish to answer.

Going Further:

According to the latest counts, 20 families, 40 genera, and 100 species of pterosaurs have been discovered and described from the Triassic, Jurassic, and Cretaceous Periods. *Scaphognathus* was one of the 40 genera that included two species, *Scaphognathus crassirostris* and *Scaphognathus purdoni*. Pterosaurs ranged in size from the sparrow-like *Anurognathus* to the small airplane-sized *Quetzalcoatlus*. Pterosaurs lived for about 120 million years and were the dominant airborne vertebrates of the Mesozoic Era. Pterosaurs lived and died out with the dinosaurs. What can you find out about the evolution of pterosaurs? How did they relate with birds? How could the birds have survived the mass extinction crisis of 65 million years ago, but not the pterosaurs? What factors do you think contributed to pterosaur extinction?